Defining Environmental Security: Implications for the U.S. Army

Jerome C. Glenn, Theodore J. Gordon, and Renat Perelet

Editor: Molly Landholm

December 1998

AEPI-IFP-1298

Army Environmental Policy Institute

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
DEC 1998		**00-00-1998 to 00-00-1998**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Defining Environmental Security: Implications for the U.S. Army	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **U.S. Army Environmental Policy Institute ,430 Tenth Street, NW Suite S-206,Atlanta,GA,30308**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**47**	

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The mission of Army Environmental Policy Institute (AEPI) is to assist the Army Secretariat in developing proactive policies and strategies to address environmental issues that may have significant future impacts on the Army. In the execution of this mission, AEPI is further tasked with the identification and assessment of the potential impacts on the Army of emerging environmental issues and trends.

This report is an exploration of emerging issues in the area of international environmental security. This report is not intended to be a stand-alone analysis upon which to base Army policy. Rather, its intent is to provoke thought on emerging environmental issues of importance to the Army and to present recommendations for further investigation.

* * * * *

Comments pertaining to this report are invited and should be forwarded to:

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Acknowledgments

Ms. Molly Landholm of AEPI reviewed, summarized, and expanded upon the document, "Environmental Security: Emerging International Definitions, Perceptions, and Policy Considerations," to author this report. Participation by Ms. Landholm was supported in part by an appointment to the Postgraduate Research Program at the Army Environmental Policy Institute (AEPI), administered by the Oak Ridge Institute for Science and Education (ORISE).

"Environmental Security: Emerging International Definitions, Perceptions, and Policy Considerations" was prepared for AEPI by the Millennium Project of the American Council for the United Nations University (AC/UNU) under contract number DACA01-97-P-0877. The principal authors of the AC/UNU's report were Mr. Jerome C. Glenn, Dr. Renat Perelet, and Mr. Theodore J. Gordon. Over 40 subject experts and military and environmental attaches from around the world provided input to the AC/UNU's report.

Mr. Robert Jarrett and MAJ Peter Rzeszotarski of AEPI, and COL Harry Good, U.S. Army War College fellow, provided valuable review comments. Ms. Traci Muller edited the report.

Executive Summary

In 1998, the Millennium Project of the American Council for the United Nations University (AC/UNU) conducted a two-questionnaire survey for an international environmental security study. The first questionnaire asked about existing and proposed definitions of environmental security, potential threats, and policies to address these threats. The second questionnaire asked who should provide policy leadership for the various threats to environmental security identified in the first questionnaire. The Project also held an informal meeting
of military attaches on June 9, 1998 for further input. Appendix A (p.30) lists study respondents.

The study found little consensus about environmental security definitions, threats, and policy leadership around the world. However, the responses to the questionnaires did suggest some common elements a definition of environmental security
should possess (Chapter Two):

- Public safety from environmental dangers caused by natural or human processes due to ignorance, accident, mismanagement, or design.
- Amelioration of natural resource scarcity.
- Maintenance of a healthy environment.
- Amelioration of environmental degradation.
- Prevention of social disorder and conflict (promotion of social stability).

Participants then identified a series of emerging issues which they consider to pose potential threats to environmental security (Appendix B, p. 35). When asked to identify who should assume policy leadership for these threats, few suggested the military take a leadership role (Chapter Three). Nonetheless, participants agreed upon the need for military involvement under the following circumstances:

- to clean up military facilities.
- to prevent or repair military-caused environmental damages.
- to protect military troops.
- to deter military aggression stemming from environmental degradation, scarcity, or sabotage.
- to provide assistance in emergency situations, when military logistical and rapid-response experience is uniquely beneficial.

Because environmental security impacts national security and troop safety, the Army needs to participate in the development of this emerging international concern. Like other governmental units, the military would benefit from the development of a single, goal-driven definition of environmental security that guides policy making without impeding essential military operations. Accordingly, this report makes the following recommendations for Army involvement in the environmental security arena (Chapter Four):

1. Participate in the environmental security definition process, building upon the preliminary results of this study and including the same group of experts.

2. Work with the same or an expanded network of experts to define the appropriate military role in matters of environmental security.

3. Support the development of an early warning system to identify environmental security threats. Monitor these threats for military implications. Devise a reporting system to alert military decision makers to developing threats and their implications.

4. Create an inventory of international protocals, treaties, and conventions which address threats to environmental security. Assess the effect of these agreements on the ability of the Army to carry out its role in ensuring environmental security for the U.S.

5. Incorporate environmental security goals and responsibilities into the U.S. National Security Strategy, National Military Strategy, Total Army Plan, and strategic action plans. Include environmental security topics in military-to-military instructional and information-sharing activities.

6. Create generic indicators of environmental security readiness. Identify and resolve exposed gaps in readiness.

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List of Acronyms

AC/UNU:	American Council for the United Nations University
AEPI:	Army Environmental Policy Institute
DoD:	Department of Defense
DODD:	Department of Defense Directive
NATO:	North Atlantic Treaty Organization
NGOs:	Non-governmental organizations
UNEP:	United Nations Environment Programme
U.S.:	United States
WHO:	World Health Organization

1 Introduction

1.1 Purpose

The concept of environmental security is gaining interest and attention worldwide. Yet, little consensus exists concerning how to define environmental security and who should take a policy leadership role to address environmental security threats. When a Millennium Project global assessment of future developments conducted in 1996[1] identified this issue as increasingly important but poorly understood, the Project welcomed the opportunity to engage a cross-section of international experts to provide a better understanding of this emerging concept.

1.2 Method

Millennium Project staff drafted a set of questionnaires for a two round environmental security study. The first questionnaire was sent to a panel of 60 individuals, including:

- Millennium Project participants.
- individuals recommended by an 18-member advisory committee.
- individuals identified by literature review.
- selected embassy military and environmental attaches to Washington, D.C.

The 40 respondents are listed in Appendix A.

The questionnaire posed the following questions:

1. Does your country have an official definition of environmental security?

2. How should environmental security be defined?

3. What are potential threats to environmental security?

4. What general policies should address this issue, and who should provide the leadership?

During the process of inviting embassy representatives to respond to the questionnaire, several military attaches requested that the Millennium Project conduct an informal meeting to share initial results. This meeting, held at the World Bank on June 9, 1998, provided an opportunity to collect more subjective views and receive feedback not easily collected by other means. The meeting and subsequent telephone conversations with several embassy military attaches confirmed that the study initiated dialogues in many national governments about the nature of environmental security.

The second round of the questionnaire asked who should provide the policy leadership for the threats identified in the first round questionnaire. It was sent to those who attended the group discussion at the World Bank as well as to approximately 20 embassies in Washington, D.C.

2 Defining Environmental Security

2.1 Existing Definitions

Few countries have an official definition of environmental security that unifies thought and action. The Russian Federation and the Commonwealth of Independent States submitted the following definitions:

Russian Federation

> "Environmental security is protectedness of natural environment and vital interests of citizens, society, the state from internal and external impacts, adverse processes and trends in development that threaten human health, biodiversity and sustainable functioning of ecosystems, and survival of humankind. Environmental security is an integral part of Russia's national security." (as adopted at a meeting of the inter-agency commission on environmental security on October 13, 1994, ref. "Environmental Security of Russia," issue 2, The Security Council of the Russian Federation, Moscow, 1996, p.55.)

Commonwealth of Independent States

> "Environmental security is the state of protection of vital interests of the individual, society, natural environment from threats resulting from anthropogenic and natural impacts on the environment." (1996 advisory legislative act, "On Environmental Security.")

Representatives from Argentina and India also indicated their countries have official definitions. The United States has several working definitions, and a Department of Defense (DoD) Directive includes a programmatic definition (Box 2.1). Respondents in China, Australia, and Hungary said their governments are currently creating a definition.

BOX 2.1 DODD 4715.1 (24 February 1996)

The environmental security program enhances readiness by institutionalizing the Department of Defense's environmental, safety, and occupational health awareness, making it an integral part of the Department's daily activities. Environmental Security is comprised of restoration, compliance, conservation, pollution prevention, safety, occupational health, explosives safety, fire and emergency services, pest management, environmental security technology, and international activities, which are explained, as follows:

a. Restoration is identification, evaluation, containment, treatment, and/or removal of contamination so that it no longer poses a threat to public health and environment.

b. Compliance is meeting applicable statutory, Executive Order, and regulatory standards for all environmental security functions, including Foreign Governing Standards or the Overseas Environmental Baseline Guidance Document, as appropriate.

c. Conservation is planned management, use, and protection; continued benefit for present and future generations; and prevention of exploitation, destruction, and/or neglect of natural and cultural resources.

d. Pollution prevention is source reduction as defined in 42 U.S.C 13101-13109 and other practices that reduce or eliminate the creation of pollutants through increased efficiency in the use of raw materials, energy, water, or other resources; or protection of natural resources by conservation.

e. Safety is a multifaceted program designed to prevent accidental loss of human and material resources; and protects the environment from the potentially damaging effect of DoD mishaps.

f. Occupational health protects personnel from health risks, and includes occupational medicine, illness and injury trend analysis, epidemiology, occupational health nursing, industrial hygiene, and radiological health.

BOX 2.1 DODD 4715.1 (cont.)

g. Fire and emergency services enhance combat capability by preserving life and DoD property through fire suppression, fire
prevention, fire protection engineering, and emergency resources.

h. Explosives safety protects personnel, property, and military equipment from unnecessary exposure to the hazards associated with DoD ammunition and explosives; and protects the environment from potentially damaging effects of DoD ammunition and explosives.

i. Pest management is the prevention and control of disease vectors and pests that may adversely affect the DoD mission or military operations; the health and well-being of people; structures, material, or property.

j. Environmental security technology consists of research, development, tests and evaluation, and regulatory certification of innovative technologies responsive to user needs.

k. International environmental activities include bilateral or multilateral agreements, information exchanges, cooperative agreements, and specific actions, to bring DoD resources to bear on international military-related environmental matters or as otherwise appropriate in support of national defense policy interests.

International organizations, including the United Nations Environment Program (UNEP) and the World Health Organization (WHO), do not have definitions to guide their policy. The United Nations Development Program only refers to environmental security briefly in its 1994 annual report on human development: "Environmental threats countries are facing are a combination of the degradation of local ecosystems and that of the global system. These comprise threats to environmental security." The North Atlantic Treaty Organization (NATO) continues to list environmental security, "including the reclamation of contaminated military sites, regional environmental problems and natural and man-made disasters," among its most important priorities.

2.2 Suggested Definitions

After a preliminary literature search, Millennium Project staff condensed a range of definitions into five candidates and presented them to the Environmental Security Panel in a questionnaire. Panelists used the following scale to rate the definitions:

1= Excellent. Should be used as the definition.
2= Extremely useful. With some modification could be used as a definition.
3= Very useful, but needs elements of others to make it more complete and useful.
4= Useful but incomplete. It could be used to add to other definitions.
5= Not useful. Misleads the policy discussion.

The Project offered these definitions, listed by average rating in descending order of perceived utility:

3.2 Environmental security is the relative public safety from environmental dangers caused by natural or human processes due to ignorance, accident, mismanagement or design and originating within or across national borders.

3.45 Environmental security is the state of human-environment dynamics that includes restoration of the environment damaged by military actions, and amelioration of resource scarcities,

environmental degradation, and biological threats that could lead to social disorder and conflict.

4.1 Environmental security is the maintenance of the physical surroundings of society for its needs without diminishing the natural stock.

4.15 Environmental security is the freedom from social instability due to environmental degradation.

4.4 Environmental security is the cycling of natural resources to products, to wastes, to natural resources in ways that promote social stability.

Eleven respondents offered alternate definitions (not ranked):

1. Environmental security is the proactive minimization of anthropogenic threats to the functional integrity of the biosphere and thus to its interdependent human component. (Barnett, J. 1997. "Environmental Security: Now What?", seminar, Department of International Relations, Keele University, December 4.)

2. Environmental security is a term used by scholars and practitioners to posit linkages between environmental conditions and security interests. Although competing notions of environmental security abound, they generally fall into three sets of claims: (1) States and non-state actors should guard against environmental degradation for the same reason they guard against organized violence; both kinds of threats can harm human, material, and natural resources on a large and disruptive scale. (2) Local and regional environmental degradation and/or resource scarcities (exacerbated by population

growth, inequitable wealth distribution, and global environmental changes) are an important contributing factor to sub-national political instability and violent conflict. (3) Military and security institutions (including intelligence agencies) can and should play a greater role in environmental protection. The rise in popularity of environmental security slogans has accompanied the increasingly prominent calls for new definitions of security to replace Cold War concepts.

3. The term environmental security refers to a range of concerns that can be organized into three general categories: 1) concerns about the adverse impact of human activities on the environment; 2) concerns about the direct and indirect effects of various forms of environmental change . . . triggering, intensifying or generating the forms of conflict and instability relevant to conventional security thinking; and 3) concerns about the insecurity individuals and groups experience due to environmental change.

   The condition of environmental security is one in which social systems interact with ecological systems in sustainable ways, all individuals have fair and reasonable access to environmental goods, and mechanisms exist to address environmental crises and conflicts.

4. Environmental security is a state of the target group, either individual, collective, or national, being systematically protected from environmental risks caused by inappropriate ecological process due to ignorance, accident, mismanagement, or design.

   Security in Chinese is “An- Quan,” “An” means safe confidence and “Quan” is total or system. So environmental security, according to Chinese thinking, should be a kind of confidence of the target group in surrounding

physical conditions of its safety and health (individual and ecosytem),wealth (economic and natural assets or stock), and social, national, or global stability.

5. Environmental security is the relative public security from environmental dangers caused by natural or human processes due to ignorance, accident, mismanagement, weak management (actor pursuing private benefit so as to translate public environment capital into private economic and social capital), or by design and originating within or across national borders.

6. Environmental security is the concept that social (and thus political and economic) stability controls, and is controlled by, the abundance and distribution of natural resources.

7. Environmental security is the relative public safety from environmental dangers caused by natural causes, economic activity or military actions. It includes the amelioration of resource scarcities, environmental degradation, and biological threats that could lead to conflict.

8. Environmental security addresses the consequences of environmental degradation, broadly defined to include depletion or degradation of natural resources such as air, water, land; unwise development or land use practices that may contribute to societal, political, or economic instability or conflict.

9. Public safety from environmental dangers and freedom from social instability due to environmental degradation.

10. Elements of 2.1 and 2.2 of the initial definitions from Round 1 Survey[2] should be combined for a more complete definition.

11. Combine definitions 2.5 and 2.1 of the initial definitions from the round one survey[3] to make: Environmental security is the freedom from social instability due to environmental degradation. It means the relative public safety from environmental dangers caused by natural or human processes due to ignorance, accident, mismanagement, or design and originating within or across national borders.

2.3 Analysis

Box 2.2 highlights the common elements of the diverse definitions discussed above. Based on the comments of various study participants, a complete definition of environmental security needs to address these elements.

BOX 2.2 Key Elements in Environmental Security

1. Public safety from environmental dangers caused by natural or human processes due to ignorance, accident, mismanagement, or design.
2. Amelioration of natural resource scarcity.
3. Maintenance of a healthy environment.
4. Amelioration of environmental degradation.
5. Prevention of social disorder and conflict (promotion of social stability).

2.3.1 Element 1: Public safety from environmental dangers.

Some participants objected to the phrase "public safety," which carries different connotations in various contexts and in different nations. However, participants agreed that protection of human health and safety is a vital component of environmental security.

The comments suggest that the environmental dangers include disasters, resource scarcities, and environmental degradation within and across national borders. Some participants commented on the ambiguity and possible redundancy of the terms ignorance, accident, and mismanagement. This report offers the following alternative: whether incidental, accidental, or intentional.

2.3.2 Amelioration of natural resource scarcity.

Study participants emphasized the role of scarcity in civil and regional instability. Whether caused by resource depletion, geographic unavailability, or inadequate distribution, scarcity can compound political, economic, religious, and military friction and lead to conflict.

2.3.3 Maintenance of a healthy environment (to maintain stability).

A healthy environment was often mentioned as a cornerstone to environmental security. Maintaining environmental health includes "assessing, correcting, controlling, and preventing those factors in the environment that can potentially affect adversely the health of present and future generations."[4] Like scarcity, environmental health threats can contribute to local and regional instability. Additionally, a healthy (and therefore functional) environment supports the natural systems that maintain all life on earth. Participants mention sustainable development as a means to ensure the long-term health of the environment, therefore preventing future environmental insecurity.

2.3.4 Amelioration of environmental degradation.

This element is closely tied to other elements of environmental security. Environmental degradation threatens human health, resource availability, and the normal functioning of natural systems.

2.3.5 Prevention of social disorder and conflict (promotion of social stability).

Almost every suggested definition listed as a key component the promotion of social stability and/or prevention of conflict. Each of the above elements, unfulfilled, can undermine social stability, especially in localities/nations/regions already experiencing political, economic, or social difficulties. In addition, transborder pollution and natural resource disputes lead to political and military hostilities. Armed conflict can both lead to, and arise from, acts of environmental sabotage.

This element highlights the link between environmental security and national security.

2.4 Military Implications

Like many other governmental organizations around the world, the U.S. Department of Defense lacks a definition of environmental security to guide its policy. While DODD 4715.1 places the functions of the military's environmental program under the rubric of environmental security, the directive does not state a definition of or a goal for environmental security. Nor do the topical areas identified in DODD 4715.1 correspond to the key elements identified by the international participants in this study as important components of environmental security.

Like the other governmental organizations, DoD would benefit from a clearly stated, comprehensive definition of environmental security to unify its programs and to guide its actions toward a goal. An internationally-accepted definition of environmental security would allow governments and militaries to implement similar programs with common goals. DoD needs to participate in this process so that the resulting definition of environmental security will assist goal setting and policy making without impeding essential military operations.

3 Environmental Security Threats and Responsibilities

3.1 Potential Environmental Security Threats

The first round of the questionnaire asked panelists to identify possible future threats, whether human-induced, intentional, or natural. This exercise created the extensive list of potential threats presented in Appendix B.

Round two asked participants to identify one or two such issues as the most important environmental security threats within the next ten years. Following are the panelists' responses, which have not been ordered by rank:

- Climate change – not for its manifestations but for the momentum or lack of action.
- Deforestation.
- Environmental refugees.
- Food security.
- Global warming.
- Human population growth and loss of biodiversity.
- Industrial contamination of air and oceans.
- Nuclear safety issues.
- Ozone depletion.
- Soil conservation/erosion.
- Water scarcity and pollution including ground water contamination.

3.2 Responsibility to Address Environmental Security Threats

Round two of the questionnaire also asked participants to identify who should provide policy leadership for these environmental security threats. Participants were given the following options:

1 = International organizations
2 = National government military organizations

3 = National government civilian agencies
4 = National government intelligence agencies
5 = Corporations, private sector
6 = Non-governmental organizations (NGOs)
7 = Not clear who has the lead-responsibility
8 = Others, specify

The Millennium Project created a classification consisting of six categories into which to divide the threats:

C1. Within a country, by ignorance and/or mismanagement
C2. Within a country, by intention
C3. Within a country, mix of natural and human action
C4. Trans-border, by ignorance and/or mismanagement
C5. Trans-border, by intention
C6. Trans-border, mix of natural and human action

Appendix B contains a full list of threats by category and the policy responsibility suggested for each. Table 3.1 summarizes this information by category.

Participants rarely reached consensus about who should assume policy responsibility for a threat. However, participants identified very few threats where military or intelligence organizations should take a leadership role. In all such cases, military and intelligence agencies share responsibility with other organizations.

TABLE 3.1 Number of Threats by Category and Leadership

Responsibility	w/out country, by ignorance	within country, by intention	within country, mix of human & natural	trans-border, by ignorance	trans-border, by intention	trans-border, mix of human & natural
international	15	6	7	21	3	12
national govt: military org.	2		1	4		1
national govt: civilian agency	20	6	7	15	3	11
national govt: intelligence		1	1			1
privat corp	1	1		3		
NGO	2	1	2	1		1
not clear						
others						

Participants specified the following threats for leadership by:

Military organizations

- Radioactive waste management; underground nuclear waste storage tanks (responsibility shared with national civilian agencies).
- Disposal of hazardous/toxic wastes (shared with civilian agencies, international organizations, and private corporations).
- Earthquake disasters (shared with civilian agencies, international organizations, intelligence agencies, and NGOs).
- Low radiation from accidents occurring in old nuclear power-plants (shared with civilian agencies and international organizations)
- Spills from stockpiles of "old weapons" (shared with civilian agencies and international organizations)
- Radioactive waste management (shared with civilian agencies and international organizations)

- Disposal of chemical and biological wastes (shared with civilian agencies and international organizations)

Intelligence agencies

- Poisoning of water resources (shared with civilian agencies and international organizations)
- Emerging diseases (shared with civilian agencies and international organizations)

3.3 Military Implications

Study participants did not advocate an active leadership role for the military in most matters of environmental security. For every threat listed in Appendix B, international organizations and national government civilian agencies head the list of possible leading parties. "[T]he civilian government," one participant commented, "… may choose to have their militaries and intelligence communities step forward to support when necessary, generally in times of crisis; however, military and intelligence responses are not the solution for any of these complex issues."

Participants agreed the military should become involved in environmental security threats under certain circumstances:

- to clean up military facilities.
- to prevent or repair military-related environmental damages.
- to protect military troops.
- to deter military aggression stemming from environmental degradation, scarcity, or sabotage.
- to provide assistance in emergency situations, where military logistical and rapid-response experience is uniquely beneficial.

Some study participants expressed concern over any financial commitment to environmental security that may be required of the military:
"What percent of the Army's capacity should be used for deterrence of transborder military incursions of the U.S. and its allies, and what percent for lo-

gistical and related support for countries with potential environmentally driven conflict?"

"Will money be taken from military budgets to solve environmental problems or will the military get involved in solving environmental problems beyond those they directly cause in training and other activities? In *Fighting for Survival*, a World Watch report, Renner[5] argues that US$200 billion of the world's $800 billion military budgets should be used to preserve and manage our natural environment." [Renner bases his argument on the idea that only the military has the logistic capacity and financial resources to manage complex global problems.]

DoD needs to delineate which environmental security threats fall within their realm of responsibility . By stating an explicit definition and specific goals for DoD environmental security, the military can ensure that new, non-military issues do not impede mission responsibilities while still actively participating in appropriate environmental security activities.

4 Recommendations

As international attention to environmental security accelerates, the importance of military participation increases. DODD 4715.1 places the entire DoD environmental program under the heading "environmental security." However, the directive does not provide an encompassing definition to guide the required goal setting and program development. Nor does the directive address how the services should respond to environmental security threats.

As one of the "DoD Components" required in DODD 4715.1 to set and meet environmental security goals and objectives, the Army will benefit from continued participation in the development of environmental security from a concept to a functional area. This report provides only a beginning. For the Army to remain proactive in the evolving arena of environmental security, this report makes the following recommendations:

1. Participate in the environmental security definition process to provide a vital military perspective. A widely-accepted, comprehensive definition of environmental security would reduce the ambiguity surrounding what issues and actions constitute environmental security. A formal definition would also aid the defense community in addressing DODD 4715.1, and when responding to Congressional and White House environmental security concerns.

The 1998 study performed by the AC/UNU for the Army Environmental Policy Institute laid the groundwork for this process. Many participants expressed interest in continuing the discussion. Building on the preliminary results, AEPI can work with the same or an expanded group of experts to formalize a working definition of environmental security that addresses Army concerns. This definition could serve as the basis for a DoD-level environmental security definition.

2. Work with the same or an expanded network of experts to define the appropriate military role in matters of environmental security. When identifying appropriate agencies to assume policy leadership for certain environmental security threats, most participants supported limited military involvement. Specifying and formalizing a conclusion on this point would be of

great benefit to DoD, and therefore the Army, when delimiting and purporting proper military roles and responsibilities in environmental security.

Similarly, clarify if and when specific disaster scenarios constitute environmental security incidents. Clearly define and outline the Army's response to these events in support of lead agencies (as detailed by the Federal Response Plan).

3. Support the development of an early warning system to identify environmental security threats. Monitor these threats for military implications. Devise a reporting system to alert military decision makers to developing threats and their implications. Using this system, the Army could anticipate threats and participate in the decisions concerning if, when, and how the military will become involved in threat resolution.

[This recommendation requires the development of indicators for environmental security, an endeavor under way in many academic forums.]

4. Create an inventory of international protocals, treaties, and conventions which address threats to environmental security. Assess the effect of these agreements on the ability of the Army to carry out its role in ensuring environmental security for the U.S. What responsibilities do they create and for whom? What is the expected military/Army response?

5. Incorporate environmental security goals and responsibilities into the U.S. National Security Strategy, National Military Strategy, Total Army Plan, and strategic action plans.
Include environmental security topics in military-to-military instructional and information-sharing activities.

These actions would facilitate the development and employment of Army programs to address environmental security, thus increasing the Army's readiness to respond to environmental security threats.

6. Create generic indicators of environmental security readiness. Using the "Framework for Environmental Security" (Appendix C) as a checklist, conduct an internal review of the Army's readiness to address the range of threats listed, and the effectiveness of agreements with the institutions listed.

Identify gaps in environmental security readiness and develop plans to address them.

Appendix A: List of Respondents

The following individuals participated in at least one of the two rounds of the Environmental Security Study questionnaires and/or participated in the June 9, 1998 meeting at the World Bank.

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Washington, D.C. USA

Lt. Col. Salim Raad
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Commander Richard DT Hobbs Ran
Director Environmental Security Cooperation
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Appendix B: Threats and Responsibilities

Participants identified a number of developing issues as potential threats to environmental security. The threats appear below, along with suggestions for who should assume policy responsibility. Opinions often differed concerning who should lead any policy response, as the tables on the following pages show.

1 = International organizations
2 = National government's military organizations
3 = National government's civilian agencies
4 = National government's intelligence agencies
5 = Corporations, private sector
6 = Non-governmental organizations (NGOs)
7 = Not clear who has the lead-responsibility
8 = Others, specify

Within a Country, By Ignorance and/or Mismanagement

Threat	Responsibility
Particulate emission in power plants and factories.	no agreement
Over-fishing, and environmentally irresponsible fishing techniques.	3, some 1 and 6
Extraction and transport of oil and other resources in environmentally sensitive areas.	1 and 3
Transportation of alien species into new ecosystems.	1 and 3
Chemicalization of sources and sinks causing depletion of human health and reproductive capacity.	3 and 1
Water scarcity (especially in the Middle East, parts of Africa and China).	1 and 3
Soil erosion (worldwide problem).	1 and 3, some 6
Disease epidemics (e.g., cholera in Peru 1991).	3, some 1
Old growth forest depletion.	3
Radioactive waste management; underground nuclear waste storage tanks.	3, some 2
Solid waste.	3
Urban oil burning power plants.	3
Disposal of hazardous/toxic wastes.	3, some 1, 2, and 5
Increasing and intensive use of chemical fertilizer, pesticides, and detergents.	3, some 1 and 5
Depletion/damming of internal rivers causing ecological change.	3
Contamination of soil through spills or leakage of solid/liquids requiring remediation.	3 and 1
Lack of effective exploitation of mineral resource scattering at village and local levels with primary technology, without or lack of effective official management.	3, some 1
Over-consumption trends around the world.	1
Settlement/development or encroachment onto hazardous environments such as riverine and coastal flood plains, earthquake-prone, and volcanically active zones.	3, some 1
Settlement/development/misuse of sensitive/hazardous or unsustainable development environments such as marginal grasslands/arid environments.	3, some 1
Settlement/development/misuse of ecologically sensitive zones such as certain forest, desert, wetland, and marine environments.	3, some 1
Diversion/misuse of water resources such as diversion of water courses to agricultural or urban areas at the expense of draining environmentally sensitive wetlands.	3, some 1

Within a Country, By Intention

Threat	Responsibility
Draining of southern marshes in Iraq.	1 and 3
Use of specialized equipment by some bottom trawlers which specifically designed to "condition" the sea floor by leveling rock formations and coral heads which serve as critical habit for local species.	1, some 3
Poisoning of water resources (groundwater and surface water).	3, some 4 and 1
Rapid development of rural industrial development in China.	3 with 1, some 5
Soil erosion due to increasing population demands for food.	1, some 3 and 6
Diversion/misuse of water resources such as diversion of water courses to agricultural or urban areas at the expense of draining environmentally sensitive wetlands.	1 and 3

Within a Country, Mix of Natural and Human Action

Threat	Responsibility
Fires (e.g. Indonesia).	1
Transport /introduction of non-native species.	1 and 3
Fishery depletion.	1 and 3, some 6
Earthquake disasters.	3, 1, some 2, 4, 6
Falling and even stopping river flows.	3
Settlement/development/misuse of sensitive/ hazardous or unsustainable development environments such as marginal grasslands/arid environments.	3, some 1
Settlement/development or encroachment onto hazardous environments such as riverine and coastal flood plains, earthquake-prone, and volcanically active zones.	3, some 1
Settlement/development/misuse of ecologically sensitive zones such as certain forest, desert, wetland, and marine environments.	3, some 1

Trans-border, By Ignorance and/or Mismanagement

Threat	Responsibility
Depletion of fisheries.	1
Extraction and transport of oil and other resources in environmentally sensitive areas.	1
Transportation of alien species into new ecosystems.	1
Chemicalization of sources and sinks causing depletion of human health and reproductive capacity.	1
Ozone layer depletion.	1
Global climate change due to greenhouse gases.	1, some 3 and 5
Air pollution and acid rain in newly industrialized countries using old technologies (China, India, Brazil, South Africa).	1 and 3, some 5
Poverty.	1 and 3, some 6
Low radiation from accidents occurring in old nuclear powerplants.	3, some 1 and 2
Spills from stockpiles of "old weapons."	1, 2, and 3
Radioactive waste management.	3, some 1 and 2
Disposal of chemical and biological wastes.	3, 2, and 1
Water competition and dam construction.	3 and 1
The huge amount of coal burning in China (around 800 million tons of coals directly burned annually).	3, some 1 and 5
Over fishing of threatened species (e.g. Southern Bluefin Tuna and Patagonia Tooth Fish).	1 and 3
Environmental impacts of mismanaged human migrations.	1
Scarcity of fossil energy (oil/gas), other scarce sources.	1, some 3
Settlement/development/misuse of sensitive/ hazardous or unsustainable development environments such as marginal grasslands/arid environments.	3 and 1
Settlement/development or encroachment onto hazardous environments such as riverine and coastal flood plains, earthquake-prone, and volcanically active zones.	1 and 3
Diversion/misuse of water resources such as diversion of water courses to agricultural or urban areas at the expense of draining environmentally sensitive wetlands.	1 and 3
Settlement/development/misuse of ecologically sensitive zones such as certain forest, desert, wetland, and marine environments.	3 and 1

Trans-border, by Intention

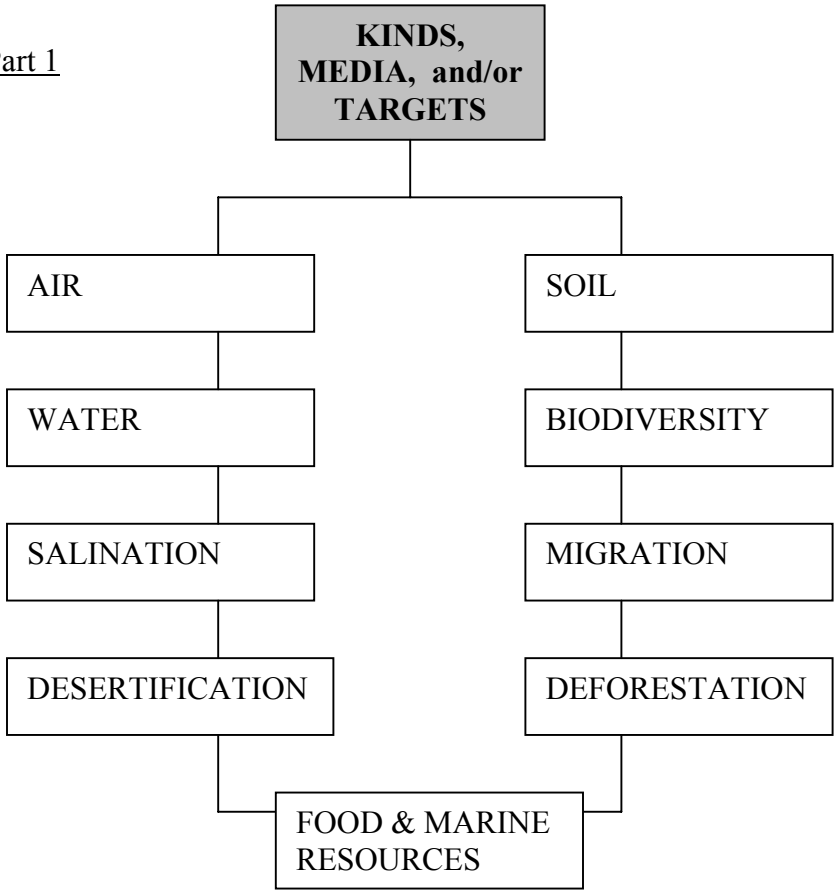
Threat	Responsibility
Poisoning water resources (groundwater and surface water).	1, some 3
River usage/control . Dam construction in Turkey-Iraq (competition for water), in N. Korea-S Korea. Diversion/misuse of water resources (e.g. agricultural or urban areas) at the expense of draining environmentally sensitive wetlands.	1, some 3
Use of specialized equipment by some bottom trawlers specifically designed to "condition" the sea floor by leveling rock formations and coral heads which serve as critical habit for local species.	1, some 3

Trans-border, Mix of Natural and Human Action

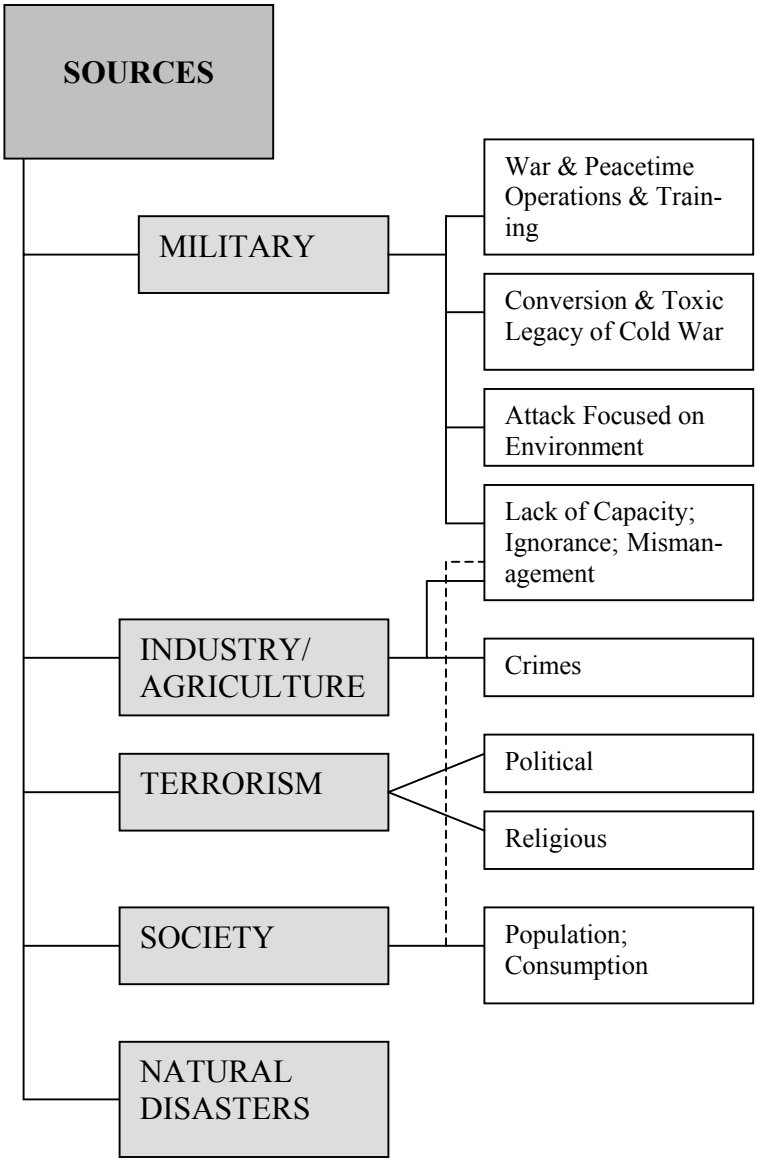
Threat	Responsibility
Emerging diseases.	1, little 3 and 4
Spread of drug resistant infectious disease.	1, some 3
Ice storm disaster in Quebec and eastern Ontario.	3 and 1, some 2
Human population growth.	1, some 3 and 6
Poverty and the widening gap between " rich and poor."	3 and 1
Increasing spiritual disconnectedness from Nature.	1
Big fires that are occurring , more and more frequently, in the rain forest (Indonesia, Australia, Amazonia) and Mediterranean countries.	1, some 3
Desertification.	1, some 3
Infectious diseases of plants and animals.	1, some 3
Settlement/development/misuse of sensitive/ hazardous or unsustainable development environments such as marginal grasslands/arid environments.	1, some 3
Settlement/development or encroachment onto hazardous environments such as riverine and coastal flood plains, earthquake-prone, and volcanically active zones.	1, some 3
Settlement/development/misuse of ecologically sensitive zones such as certain forest, desert, wetland, and marine environments.	1, some 3

Appendix C: Framework for Environmental Security

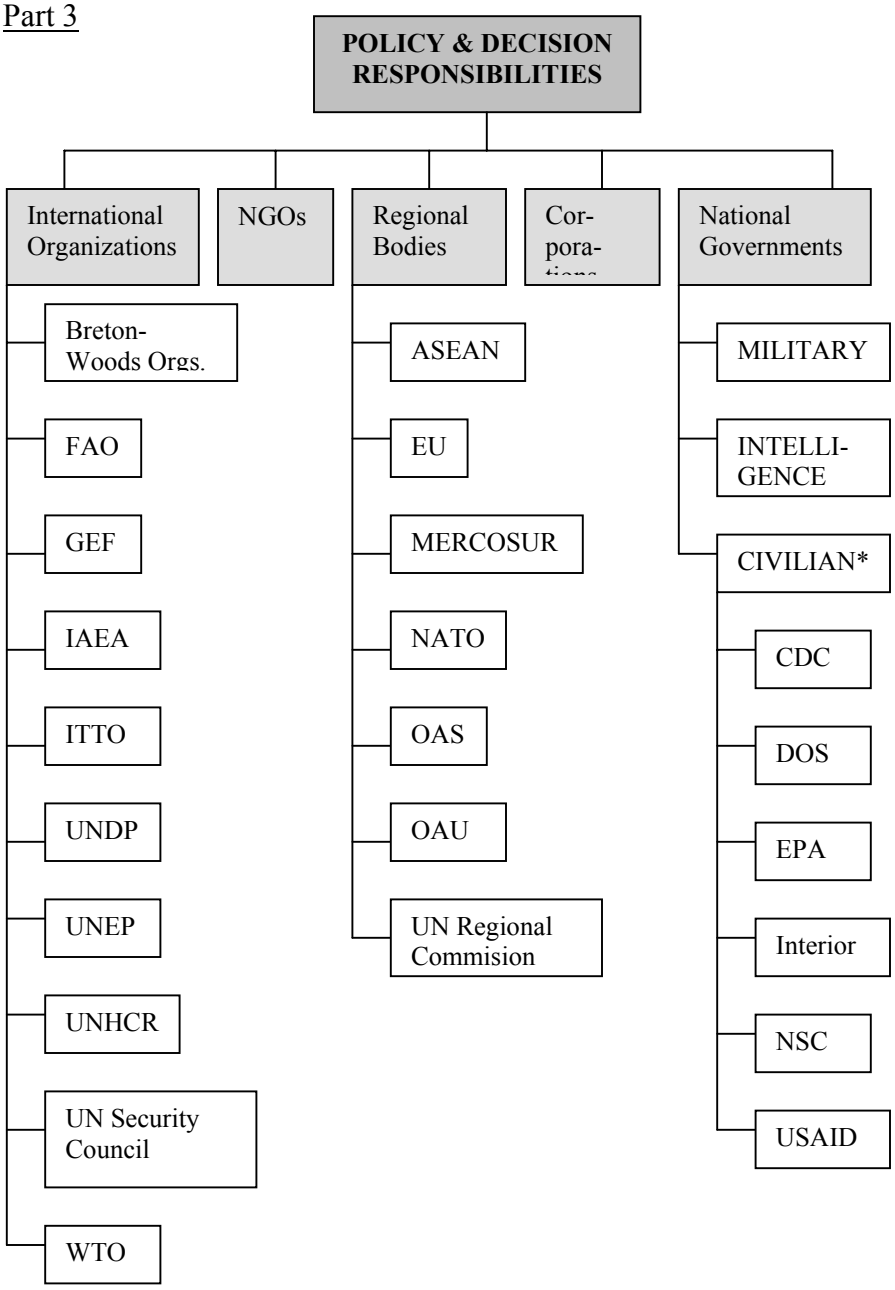
Part 1



Part 2


SOURCES
MILITARY
War & Peacetime Operations & Training
Conversion & Toxic Legacy of Cold War
Attack Focused on Environment
Lack of Capacity; Ignorance; Mismanagement
INDUSTRY/ AGRICULTURE
Crimes
TERRORISM
Political
Religious
SOCIETY
Population; Consumption
NATURAL DISASTERS

Part 3



* agencies from the U.S. shown as examples

Endnotes

[1] Millennium Project. 1997. 1997 State of the Future. Washington, D.C.: American Council for the United Nations University.

First and second Project definitions as ranked above.

[3] First and fourth Project definitions as ranked above.

[4] As defined by the World Health Organization (WHO) Regional Office for Europe.

[5] Michael Renner. 1996. Fighting for Survival. Worldwatch Institute Environmental Alert Series, New York: W.W. Norton and Company, 1996.